nature geoscience

SUPPLEMENTARY INFORMATION

DOI: 10.1038/NGEO2992

In the format provided by the authors and unedited.

Microbial oxidation as a methane sink beneath the West Antarctic Ice Sheet

Alexander B. Michaud[1,†,*], John E. Dore[1], Amanda M. Achberger[2,‡], Brent C. Christner[2,3], Andrew C. Mitchell[4], Mark L. Skidmore[5], Trista J. Vick-Majors[1,††], and John C. Priscu[1,*]

[1] Department of Land Resources and Environmental Sciences, Montana State University, Bozeman, MT, 59717, USA
[2] Department of Biological Sciences, Louisiana State University, Baton Rouge, LA, 70803, USA
[3] Department of Microbiology and Cell Science, University of Florida, Gainesville, FL, 32611, USA
[4] Department of Geography and Earth Sciences, Aberystwyth University, Aberystwyth, SY23 3DB, UK
[5] Department of Earth Sciences, Montana State University, Bozeman, MT, 59717, USA

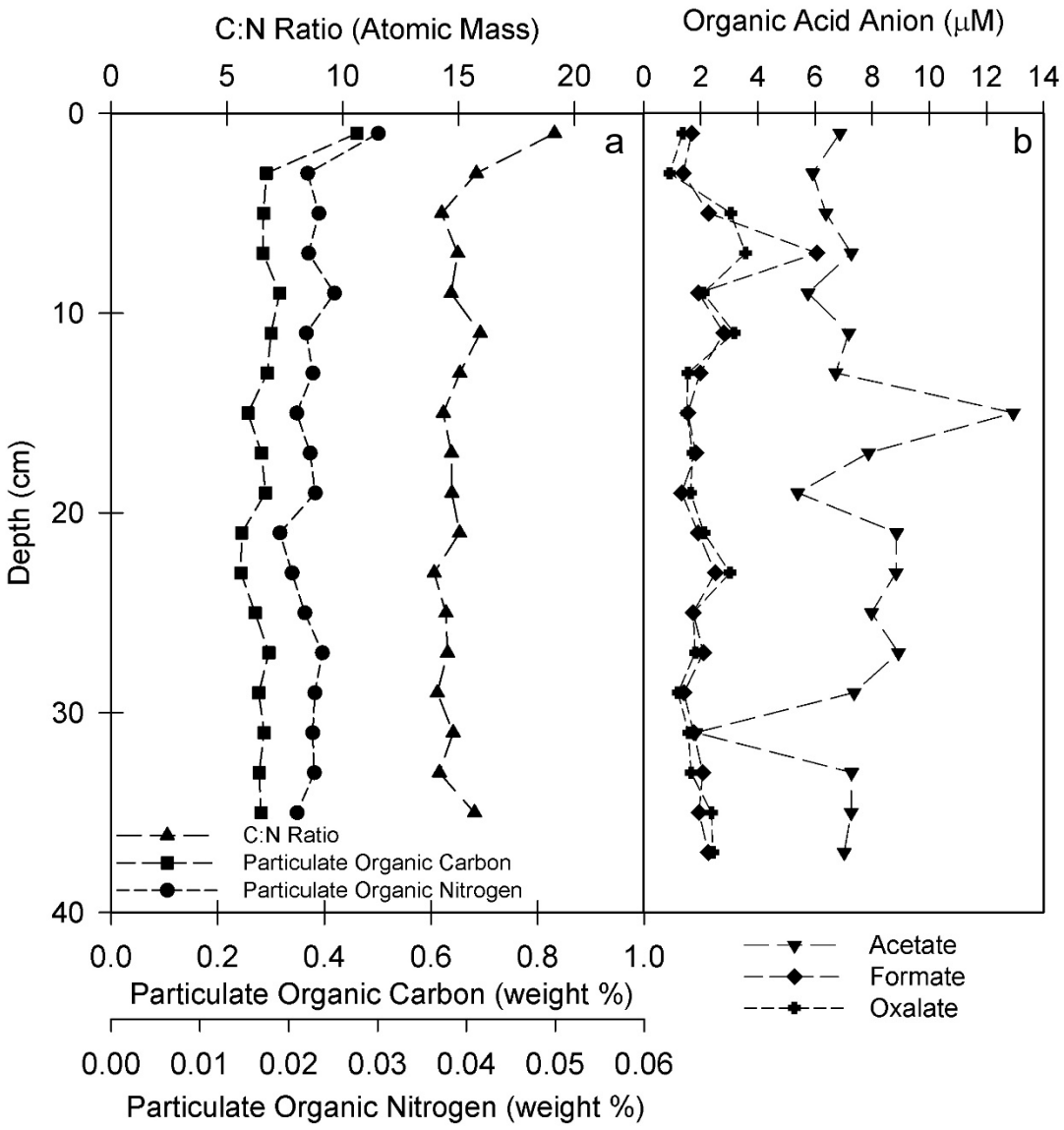
[*] Correspondence to: John C. Priscu, jpriscu@montana.edu or Alexander B. Michaud, abmichaud@gmail.com
[†] Present Address: Center for Geomicrobiology, Department of Bioscience, Aarhus University, 8000 Aarhus C, DK
[‡] Present Address: Department of Oceanography, Texas A&M University, College Station, TX, 77840, USA
[††] Present Address: Département des Sciences Biologiques, Université du Québec à Montréal, Case Postale 8888, Succursale Centre-Ville, Montréal, Quebec, Canada H3C 3P8

List of Supplementary Tables:

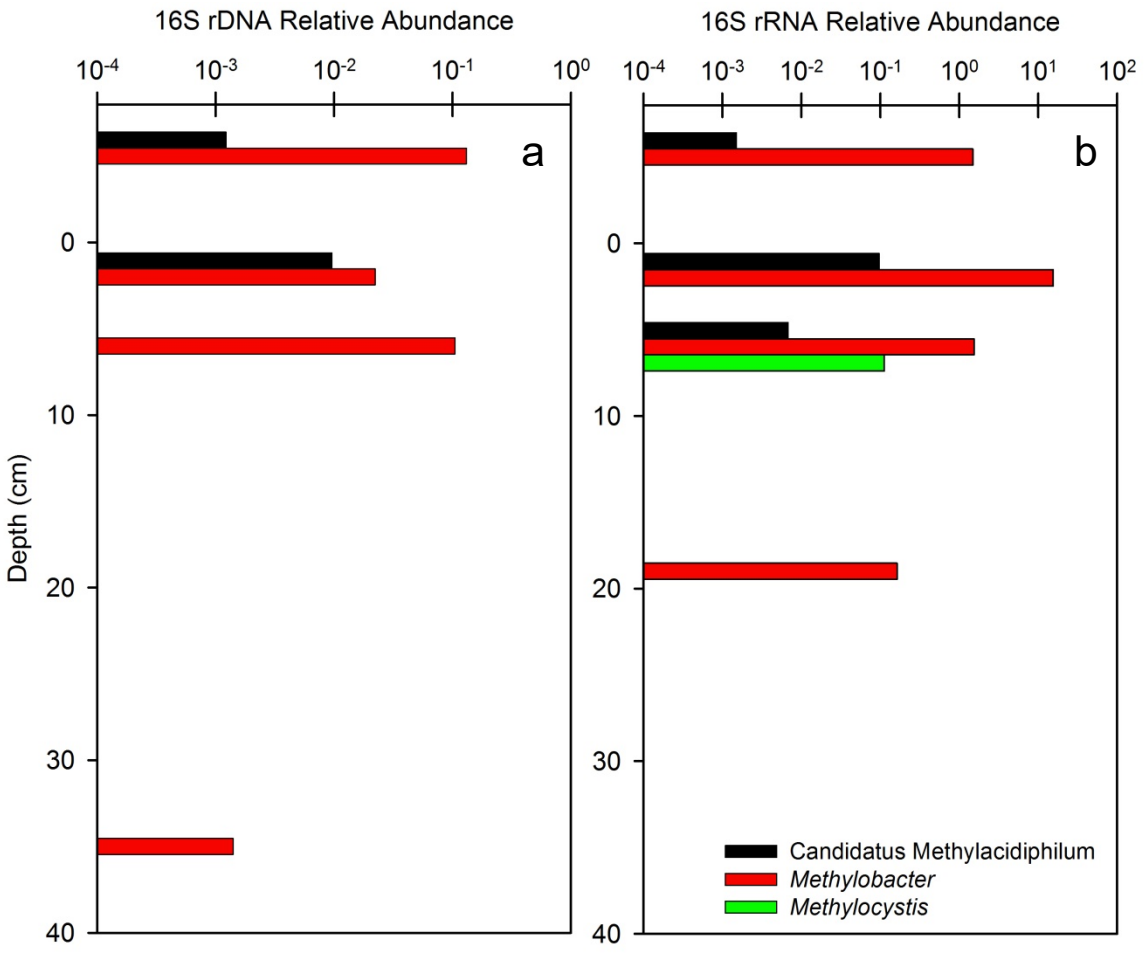
List of Supplemental Figures

Supplemental Table 1. Sensitivity analysis of the CH_4 oxidation and incorporation model in SLW. The flux of CH_4 is presented as the average plus or minus the standard deviation (6.8 ± 1.8 mmol CH_4 m^{-2} y^{-1}). R is the total removal of CH_4, which is composed of both R_{incorp} and R_{ox}. The partitioning of R into biomass incorporation (R_{incorp}) and oxidation to CO_2 (R_{ox}) is controlled by the fraction of CH_4 to biomass parameter. The fraction of CH_4 to biomass parameter varies widely in nature, and this variability is captured by the range presented for each flux value. The biomass incorporation rate and O_2 consumption due to CH_4 oxidation as a percent of the total O_2 demand in SLW are presented at each flux value and values across the published range of fraction of CH_4 to biomass values.

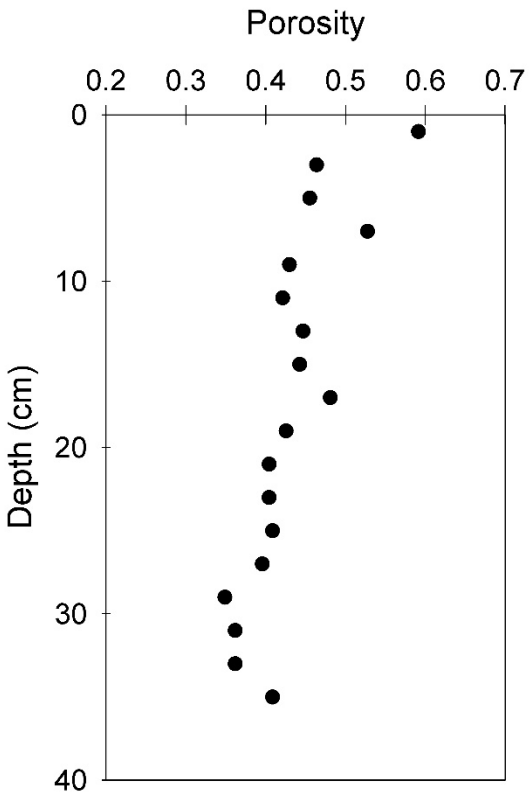
Flux (mmol CH_4 m^{-2} y^{-1})	R (mmol CH_4 m^{-3} y^{-1})	Fraction of CH_4 to biomass	R_{incorp} (mmol CH_4 m^{-3} y^{-1})	R_{ox} (mmol CH_4 m^{-3} y^{-1})	Biomass incorporation rate (ngC L(sediment porewater)$^{-1}$ d^{-1})	O_2 consumption due to CH_4 oxidation (% of total O_2 sink)
8.6	3.9	0.06	0.23	3.6	4.0	24
		0.25	1.0	2.9	17	22
		0.5	1.9	1.9	33	19
		0.77	3.0	0.89	51	16
6.8	3.1	0.06	0.18	2.9	3.1	20
		0.25	0.77	2.3	13	18
		0.5	1.5	1.5	26	16
		0.77	2.4	0.71	40	13
5.0	2.3	0.06	0.14	2.1	2.3	15
		0.25	0.56	1.7	9.7	14
		0.5	1.1	1.1	19	12
		0.77	1.7	0.52	30	10



Supplemental Figure 1. Solid phase carbon and nitrogen content and dissolved organic acid concentration of SLW sediment. The particulate organic carbon and nitrogen and the calculated C:N ratio of SLW sediment (a). SLW sediment porewater concentration of acetate, formate and oxalate (b).



Supplemental Figure 2. Known methanotrophic genera detected in the SLW 16S rDNA (a) and rRNA (b) community analysis.



Supplemental Figure 3. SLW sediment porosity.